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Journal of the Society of Arts.

FRIDAY, APRIL 5, 1861.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE DEED.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others who take an interest in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £354,150, have already been attached to the Deed.

GUARANTEE FUND FOR THE EXHIBITION OF 1862.

The following additions have been made since the last announcement, in the *Journal* for March 29:—

*** *The name marked with an asterisk is that of a Member of the Society of Arts.*

NAME.	AMOUNT.	REPRESENTING THE OBJECTS OF THE SOCIETY—ARTS, MANUFACTURES, AND COMMERCE.
Charles Reed, F.S.A., Paternoster-row, E.C.	£100	Arts.
Edward Ellis Allen, 2 Brunswick-pl. Brompton, S.W.	100	Arts.
Samuel Robert Lock, 178, Regent-street, W.	500	Arts.
Stafford H. Northcote, 29, St. Paul's Churchyard, E.C.	250	Commerce.
Joseph Bentley, 13, Paternoster-row, E.C.	100	Arts.
T. Seville Truss, 53, Gracechurch-street, E.C.	100	Commerce.
James Joseph Stainton, Meadows of Lewisham, E.C.	100	Arts.
Jabus Stanley James, 26, Watling-street, E.C.	100	Arts.
James Grieve Lyle, 20 Little Moorfields, E.C.	200	Commerce.
James Reeve Burgess, 47, Brewer-street, Golden-square, W.	100	Commerce.
R. A. C. Loader, 23 and 24, Finsbury Pavement, E.C.	500	Commerce.
Sassoon David Sassoon, 17, Cumberland-terrace, Regent's-park, N.W.	1,000	Arts.
W. H. Martin, Burlington Arcade, W.	100	Commerce.
George W. Franklyn, M.P., Torquay	500	Arts.
Shepherd, Hill, and Co., Union Foundry, Leeds	150	Manufactures.
Thomas Richardson, Linen-hall, Dublin	200	Commerce.
*Cassell, Petter, and Galpin, Belle Sauvage-yard, E.C.	250	Arts.
Thomas Lambert (Thomas Lambert and Son), Short-street, Lambeth, S.	500	Commerce.
Miss Burdett Coutts, Stratton-street, Piccadilly, W.	3,000	Arts.

BY ORDER,

P. LE NEVE FOSTER, *Secretary.*

THIRTEENTH ANNUAL EXHIBITION OF INVENTIONS.

The Exhibition was opened on Monday last, the 1st of April, and will remain open every day until further notice, from 10 a.m. to 4 p.m., and is free to members and their friends. Members by ticket, or by written order, having their signature, may admit any number of persons. Members of Institutions in Union with the Society are admitted on showing their cards of membership.

A sheet of tickets has been issued to every member. Additional tickets may be had on application to the Secretary of the Society.

EXAMINATION PRIZE FUND, 1861.

The following are the Donations up to the present date:—

	£	s.	d.
Charles Brooke, M.A., F.R.S. (2nd donation)	2	2	0
Harry Chester, Vice-Pres. (4th donation)	5	0	0
Thomas Dixon (annual)	1	1	0
George Goff (2nd donation)	5	0	0
F. Seymour Haden (annual)	2	2	0
W. Haldimand (3rd donation)	10	10	0
James Holmes (annual)	1	1	0
Dr. Skey	1	1	0
Rev. F. Temple, D.D. (3rd donation)	5	5	0
Rev. A. Wilson (3rd donation)	2	2	0

SIXTEENTH ORDINARY MEETING.

Wednesday, April 3, 1861.

The Sixteenth Ordinary Meeting of the One Hundred and Seventh Session was held on Wednesday, the 3rd inst., Thomas Webster, Esq., F.R.S., in the chair.

The following gentlemen were proposed for election as members of the Society:—

Brett, John W.	2, Hanover-square, W.
Bruton, Leonard	Chamber of Commerce, Bristol.
Callow, James William	8, Park-lane, W.
Courtenay, L. Walter	Oak-house, Forest-hill, S.E.
Debenham, W., junr.	42, Wigmore-street, W.
Dennys, Haddock	3, Percy-terrace, Islington, N.
Dugdale, John	Burnley.
Fleming, John	21, Austin Friars, E.C.
Maull, Henry	Lewisham, S.E.; and 119, Piccadilly, W.
Potter, Wm. Simpson	1, Adam-street, Adelphi, W.C.
Robertson, Alexander	Highfield, Sheffield.
Room, Benjamin	36, Parliament-street, S.W.
Shaffner, Col. T. P.	42, Half Moon-street, Piccadilly, W.
Stevenson, James	Jedburgh, N.B.
Vulliamy, Lewis Llewellyn	Clapham-common, S.
Young, Thomas	14, Eaton-square, S.W.

The following candidates were balloted for and duly elected members of the Society:—

Abraham, Henry Robert	3, Bridge-street, Westminster, S.W.
Avery, Thomas Charles	Gloucester.
Biddulph, John	Swansea.
Blyth, Philip P.	53, Wimpole-street, W.
Bowen, Owen	4, Chatham-place, Blackfriars, E.C.
Brogden, Alexander	Ulverstone.
Broome, Robert	Burbage-house, Buxton.
Bruce, Right Hon. Sir James L., Knight	The Priory, Roehampton, S.W.
Butts, Thomas	20, Chester-terrace, Regent's-park, N.W.
Derry, David	Plymouth.
Fane, Wm. Dashwood	Board of Trade, S.W., and 7, Norfolk-crescent, Hyde-park, W.
Fisher, Peter	Whitehaven.
Fox, R. W.	Grove-hill, near Falmouth.
Halloran, Charles	Paignton School, Preston-house, near Torquay.
Hannay, Robert	Ulverstone.
Hannay, W.	Nottingham.
Harrison, George	Newport, Monmouthshire.
Harvey, John Francis	145, Strand, W.C.
MacNeill, Sir John, F.R.S.	Mount Pleasant, Dundalk.
Malcolm, John Wingfield, M.P.	7, Great Stanhope-street, Mayfair, W.
Moorsom, Vice Admiral C.B.	5, Montague-place, Russell-square, W.C.
Pain, George	New Lodge, Salisbury.
Petre, Hon. Henry W.	Bedfords, Romford.
Poole, James	Wick-house, Durdham Down, Bristol.
Pridham, T.	Hyefield, Bideford.
Saunders, Chas. Alexander	Great Western Railway Station Paddington, W.
Spowart, T.	Broomhead-house, Dunfermline.
Taylor, J. John	Earsdon, Newcastle-on-Tyne.
Terrell, William	7, Apsley-place, Redland, Bristol.
Thomson, Wm. Gordon	14, Clifton-gardens, Maida-hill, W.
Thring, Henry	5, Queen's Gate-gardens, South Kensington, W.
Turquand, William	4, Mansfield-street, Cavendish-square, W.
Tylden, J. W.	Milsted Manor, Sittingbourne, Kent.
Underwood, Joseph	5, Hyde-park-gardens, W.
Walter, Capt. Edwin	37*a*, Upper Grosvenor-street, W.
Williams, John	Ketley-hill, Wellington, Salop.

The following Institutions have been taken into Union since the last announcement:—

Derby, St. Peter's Evening Schools.
St. Thomas, Charterhouse, Evening Classes.

The Paper read was—

SOME ACCOUNT OF AMERICAN IMPLEMENTS AND ECONOMIC CONTRIVANCES.

By C. W. Eddy, M.A., M.B., formerly Travelling Fellow of the University of Oxford.

I think the observing traveller in America cannot fail to be struck with astonishment at the vast amount of work that has been achieved, of forests cleared, of land reclaimed, of roads, railroads, and canals constructed, and of cities built by a sparse and scattered population, in the brief period of time that has elapsed since the first peopling of the country. To enumerate only a few of the marvels of American progress; that great scion of the English stock has already overspread a territory equal to all Europe in extent; has dug 5,000 miles of canals, constructed 16,000 miles of railway, and built some half-dozen towns which rival in magnificence a like number of the capitals of Europe. It has formed a merchant navy not inferior to our own, if the lake and river tonnage be (as is only fair) included in the comparison; it is beginning to rival us in foreign commerce, and has supplanted us in the deep-sea fisheries; grows a cotton crop that goes far towards supplying the wants of the world, and produces a surplus of corn and provisions which feeds the West Indies and the eastern coast of South America, besides helping to maintain ourselves and several of our colonies. These are great results, and are the more surprising when it is considered that they have been achieved beneath a climate far less favourable to continuous exertion than our own, with summers whose relaxing heats unnerve the physical powers, and winters which for long months together bind nature in impenetrable folds of ice and snow. How, then, have these great results been accomplished, how but by the indomitable energies of that vigorous and ambitious race of which they are an offshoot, energies which are aided by an inventive faculty of a high order, and guided by the strong practical common sense which is their birthright. Place a people gifted with such powers as these on a territory so far severed from the old world, with all its social and political entanglements, that it may have free scope to fulfil the behest of replenishing the earth and subduing it, where, moreover, its numbers may be continually recruited by the boldest, most hardy, and adventurous spirits of the old world, and we need not wonder at the results we witness.

The faculties of the Anglo-Saxon race have been developed in each hemisphere, just as the varying exigencies of their situation have called them forth. John Bull, having but a small estate for the maintenance of his numerous family, which is crowded in the ratio of 223 to the square mile, has applied all his powers to rendering this little property as productive as possible, hence the great improvements in agriculture, in the rearing of stock, and increasing the productiveness of land, as well as a majority of the great inventions in the manufacture of raw materials, are his. The Yankee, on the other hand, having a vast wilderness to subdue, to which his race even now bears a proportion of only eight to the square mile, has directed his energies to the means whereby man's feeble physical powers may be rendered equal to so great a task, and herein has shown an originality of conception, a fertility of invention, and a boldness of enterprise truly surprising. I recently paid a visit to that part of the world, and among various objects which interested me there and engaged my attention, were the contrivances for economising labour which the necessities occasioned by its scarcity have led our cousins to invent and adopt into general use. I was struck by the ingenuity of many of their implements, their superior simplicity of construction and cheapness when compared with corresponding ones amongst ourselves. For instance, that great pioneer of civilisation, the backwoodsman's axe, costs in America one dollar. Here I am asked 9s. for one, certainly not better made, nor of better materials, for there can be no better judge of the temper and make of an axe than the backwoodsman, and the true American axe is well known to stand severe frost better than ours. No less was I struck by the simple, ready, and yet effective ways which I witnessed there for overcoming difficulties, and arriving at results which we should only suppose attainable by more elaborate and costly methods.

Of these implements and contrivances for facilitating labour I have been invited to give you some account, and have prepared some diagrams and little models in illustration of them and here, at the outset, I must premise that I do not flatter myself with the idea that I am about to introduce a series of entire novelties to the British public. You will observe objects here with which many of you are, doubtles, familiar; but I think that Englishmen, whether agriculturists, mechanics, or engineers, are not as familiar, as they should be, with the methods by which labour may be saved and is saved elsewhere; and this is a species of knowledge which either of these classes, or indeed any of us, may find very serviceable in case we transfer our industry from the crowded arena of England, where labourers are plentiful, and the division of labour is carried to its utmost extent, to the outlying and thinly-peopled parts of our vast empire, the cirstances and conditions of which closely resemble those of America, for I think it will be acknowledged that many of these happy contrivances and ways of meeting ordinary wants, which I shall have to describe as practised in America, though they may be but little suited to the highly artificial condition of England, would be likely to be found very useful in the untamed wilds of our colonies.

The question in each case turns simply on the price of manual labour; in England unskilled labour is procurable at 1s. 6d. to 2s. 6d. per day; in America, the same class of labour is frequently not to be had on any terms, and if procurable, commands one dollar or more, with food; and this too is its value in some of our own colonies, whilst in others, as the gold colonies, it is higher still. There are, however, some of these contrivances, of which you see diagrams here, very applicable in my opinion even to the wants of England, such as the spacious and powerful steam ferry boats, with the ferry docks, which are necessary appurtenances of them, the tramway cars, which I am happy to see a good attempt is being made to introduce into London, the machinery for handling grain in bulk, the stump extractor, the railway horse-power, and several of these agricultural implements, which I would I could persuade our farmers to try. But in my efforts hitherto to do so I have discovered two great obstacles to the introduction of any novelty; one is the prejudice, not confined to this class alone, in favour of everything English, and against everything foreign. Swift has said that Englishmen regard a novelty as a cow does a rubbing post set up for the first time in her field; at first she is very shy of it, at last comes and smells at it, and finally puts it to its proper use. But I have found that the cow's master takes a much longer time than the cow herself before he ventures to smell at the suspicious-looking thing. Another great obstacle arises from the difficulty of teaching the use of any novel implement to the uneducated English labourer, and the jealous hatred which he entertains for any "new fangled" device, from his fear lest it should take the bread out of his mouth. I call him uneducated, for how little instruction does he get at the village school of that practical kind which may best aid him in fighting the battle of life. It is not so in America; the scheme of education at the excellent common schools which are supported by the several states and municipalities, which every boy and girl attends, comprises instruction in the common arts of life, and the physical sciences, especially mechanics and chemistry. In this respect, at least, I think we need not fear to take example from the Americans.* But to turn to the implements.

Suppose we first consider those used for clearing land. The first in use, as in importance, is the American felling-axe, which is so well-known in every timber region of the world. It consists of a broad, wedge-shaped, head, with an ample eye, inserted into which is a long handle of tough hickory, that famous wood which is their synonym for every thing strong and tough, and which, I am happy to see, is beginning to be imported into England for the same purposes for which it is so extensively used there, viz., for handles of implements, shafts, light wheels, &c. You see how exactly the handle is curved to fit and retain the grasp. The effect of this weapon in the hands of a backwoodsman is surprising, its length of handle and perfect balance enables him to plant his blows with a force and precision of which one has no idea without seeing him at work. The head of this axe is, I am told, on the very pattern of the Headsman's axe, such a one as may be seen in the Tower by any one who may have the curiosity to compare the two. Large quantities of these axes are made by convicts in the State prisons, and sold at a slightly remunerative price, and what can be a more appropriate occupation for prisoners, than to furnish the poineers of society with a cheap instrument for extending the area of civilization. I may here observe, that the plan adopted in the large State prisons, is to let out the labour of the prisoners by contract to manufacturers, who provide the necessary tools, and instruct the prisoners in their use. This plan renders the principal State prisons entirely self-supporting, and what is of far more importance, teaches the prisoners a trade by which they may live when their time expires. I consider it a system well worthy of our imitation.

Next in order to the felling axe comes the stump-extractor, a compound lever of wood, strengthened with iron, 30 feet long, with a wheel at each end. It is worked horizontally, as you see, generally by a team of oxen. The firmest rooted stump is made the fulcrum fastened by the centre to which, and aided by these pullies, it extracts all the surrounding ones. This work is usually done by contract at an expense of about 12 dollars an acre, and for a few dollars more the stumps are drawn into line to form fences, the most durable and formidable of all dead wood fences. This is the stump extractor most generally used, simplicity and strength being its great recommendations; but I must mention another which is more compact and portable, therefore better adapted for going into the forests; it is an iron cylinder, on wheels, to which the power is applied as to a capstan. Hall, of Owego, New York State, is the maker and patentee of this latter.

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* This system produces a class of men who are called machinists, persons who understand machinery and the nature and strength of materials, besides being themselves good mechanics. These persons are capable of planning and setting up any kind of mill-work. It is a common thing for them to travel in the Southern States, erecting cotton presses, which they do with the help of a few plantation hands in a rough but effectual way, very pretty to witness. In the Northern States these men are a good deal engaged in substituting turbine wheels for the old water wheels, and this they will undertake often at their own risk, being paid by a share of the profit ensuing.

Here is a diagram showing a method of applying steam power for felling and cutting up trees, which I have seen used, but I do not recommend it, because a steam engine is too complicated and expensive a machine to be used profitably for such rough work as this. The curiosity about this is the manner in which the steam is conveyed through an armed flexible india-rubber hose from the steam chest to the cylinder, the piston rod of which is formed into a saw. It is an engine more curious than useful, and not one generally used in America.

I have mentioned one kind of dead wood fence, but the kind most used in America is what is there called a snake fence, and as this is the one which of all kinds costs the least trouble, and is the most readily put up in newly-cleared land where wood is abundant, I will describe it. It is formed by laying slabs of split stuff, no matter how rough, one over another with their ends overlapping zig-zag fashion, till the requisite height is attained, and then driving posts in at each side where the ends overlap. It is as ugly as can be, and in the States the eye gets quite weary of its monotonous uniformity, but the hard thrifty American farmer does not study the ornamental much. Not the least advantage that it possesses is that, whilst very strong against lateral pressure, it is easily pulled down in case of fire, or for removal of boundaries. Now in Australia I have known many miles of expensive post and rail fencing burnt in a few hours, owing to the difficulty of pulling it down and so arresting the fire. Cheaply as this fence is put up, so immense is the extent of it in the States that the total value of it has been computed to exceed that of all the houses and buildings there. It must be observed that there is difficulty in America in rearing live fences, owing to the severity of the cold in winter and the droughts of summer; the same difficulty is felt in our Australian colonies.

Here is an earth auger for boring post holes. It would not do for such posts as we put up, formed out of a young tree, with the root end planted in the ground, and only the part above ground squared; they, on the contrary, take care to set their posts the reverse way to that in which they have grown, or upside down, because say they, this prevents the moisture from the ground ascending in the channels in which the sap ascended whilst the tree was growing, and thus rotting the post. They also take the precaution of charring the end. I do not think this plan would be so generally adopted amongst that shrewd and practical people unless there was something in it. Portable mortising machines, worked by hand or foot, are in general use for boring the posts when that is needed; with these, however, my hearers are probably familiar.

The settler in the Eastern States or in Canada, has a more obstinate enemy to contend with than timber, in clearing his land, and this is presented by the boulders with which the whole face of the country for thousands of square miles in extent is overspread. These have undoubtedly been brought and deposited in their present localities during countless ages by ice drifting from the North, and no one who has not been there can form an idea of the extent to which they encumber the ground. It is a common saying that the principal productions of New England are ice and granite; the ice, however, which has brought the granite there, affords the means of getting rid of it, for in winter when there is little else to do, the settlers are industriously employed in sledging away these boulders. In the more Southern States, where the snow does not freeze hard enough to allow of this, the patent way of disposing of them is to bury them. They dig a hole beside a great boulder and tumble it in—out of sight, out of mind. You may think that this tells tales of superficial culture; but all American agriculture, and perhaps not this kind of culture only, is superficial. When first I heard of this way of disposing of stones by burying them, I thought it a joke, but on inquiry found it a positive fact, and I have no doubt of its being the best method under the circumstances; in fact I have so high an opinion of the shrewdness and practical sagacity of our Yankee friends, that I am disposed implicitly to believe any practice which I find in vogue amongst them to be that which is best suited to the circumstances.

The settler's house is soon put up, built of plank, both wall and roof, and lined and floored with plank, (we read of log huts, but seldom see them), for the saw-mill driven by steam or water, or in lack of these by horse power, keeps abreast of the advancing tide of population, and converts the logs into planks at a very trifling cost. The time for clearing and building is the winter, when the frozen snow makes as good a road for the lumber sleigh as can be desired. This, too, for the same reason, is the season for carrying the crops to market, for at other times the want of decent roads makes this almost impossible.

I suppose both the best and the worst roads in the world are to be met with in America; by the former I mean the plank roads, which are turnpike roads formed of 3-inch planks of hard wood, laid diagonally on a couple of stringers, the planks being fitted close together, but not fastened down. The common pavement in the country towns is also of planks. As long as these roads are kept in good repair they are as even as a drawing room floor, but when they get out of repair they are execrable. Their cost is stated at about £330 a mile for a single vehicle road, and rather more than £400 for a double one, and they are said to last good for 8 or 10 years. The cost, however, of course depends on the kind and supply of timber available, and their existence furnishes a strong proof how very cheaply timber is worked up in America. Indeed, the cost of running logs through their great water-driven saw mills is very trifling, and the operation beautiful to witness, the log being hauled up from the pond to the timber bed by the power, sawn into perhaps half-a-dozen planks at once, which are passed over rollers, and another victim hauled up in turn, all in a very few minutes. But these plank roads, unfortunately, are few and far between, and the bad roads greatly preponderate, owing to the extreme difficulty of getting men to work at what is there looked on as a degrading employment, viz., breaking stones or working on the roads.

We read of corduroy roads, *i.e.*, roads formed of trunks of trees thrown across. They are not common, however, at least not in any part of the country I have visited, for I have never seen one. The ordinary road is merely a wide track, almost impassable in wet weather. The difficulty, however, of getting men to break stones, has suggested the use of stone-crushing machines, two different kinds of which I have seen at work, and working well. One of these, that with rollers, which is adapted to crushing soft stone, is known in some parts of England, and is used extensively in America for breaking up the hard anthracite or stone coal of Pennsylvania; and the extent to which it is applicable for this purpose alone may be judged from the great quantity of this coal that is raised there, viz., eight millions of tons per annum, most of which is crushed by these rollers at a royalty of one cent. per ton. It consists of two heavy iron cylinders, studded with rows of knobs of about two inches projection, the knobs on the one playing into the intervals on the other, as they are made to revolve in opposite directions. It is driven by a steam-engine, and I have seen one of about six horse-power breaking up the Niagara limestone as fast as two men could keep it clear. These rollers are used in the mining districts of England for crushing ore, but my object in mentioning them is, because I have seen them advantageously used in America for stone-breaking, and I cannot understand why they should not be employed for that purpose in some of our colonies, where the roads, in consequence of the want of labour, are execrable. The other stone-crusher is capable of breaking up the hardest rock — quartz, hornblende, granite, &c. It consists of a ponderous mass of cast iron, against the face of which a mass of wrought iron of an elbow shape moves to and fro on a toggle joint. The motion is slight, but the power is sufficient to crack the hardest nodules and boulders like nuts; the motion gathers the stone within the iron jaws of the machine, and as it breaks up it falls through the gauge formed by the lower edges of the opposing masses, which may be called the throat. I have seen one of these at work at New York, and doing its work well. It was worked by a 12-horse-power engine; there had been two breaks-down, owing to the mistake having been committed of applying insufficient power, but with the 12 horse-power it was working well. I have no doubt both these stone-breaking engines would be found useful in our colonies; but whether they could compete with pauper and prison labour applied to this purpose in England is another matter.

The plank roads, which I mentioned above, have been adopted in the Gold Colonies of Australia, and with them another American plan for making the best of a bad road, I mean the pole and thorough brace spring. This is the only kind of spring which will stand the shocks of the very primitive roads which are met with in these young countries. One form of it was formerly used in England, and the C spring is a modification of it. It consists of a tough elastic hickory or ash pole, fixed at one end into the front of the bed of the carriage, whilst from the free end a stout leather thong extends to the same part of the bed; on this thong the body of the carriage rests; the elasticity of the pole gives the requisite spring, and the strength is due to the strain being exerted at so small an angle. The cabs and buggies in the New England States are generally hung on this plan, and all the stage coaches throughout the States use a modification of it, being a strap suspended between two such poles or between two C springs. This form of spring possesses this further great advantage for a young country, that it is formed of common materials, is therefore cheap, and can be easily made or repaired. A spring on this principle is frequently made use of for supporting merely the driver's seat in a waggon, for the driver never thinks of walking, and it would be impossible to jog over such roads without some spring. The seat is laid on the free ends of a couple of hickory poles, which are fixed at two other points into the sides of the waggon.

Another very cheap and simple spring that I have seen used occasionally is merely a couple of inch boards laid on two pair of wheels, the axles of which are about three yards apart, the seat being placed on the middle, and the length of plank giving the requisite elasticity. When elliptical steel springs are used, they are frequently reinforced with a cushion of india-rubber, or a spiral spring pinned through the centre, so that when they come down to their bearings, this additional spring comes into play. The waggons (for carts are hardly ever seen) are the simplest things in the world, the box being made of those most useful contrivances, tenoned and grooved boards slipped into a frame, to whatever height may be requisite. The wheels are usually very much lighter than ours, and owe their strength to the fewness and simplicity of their parts, being formed of three or four, instead of half a-dozen felloes, and those of the toughest wood, steamed and bent round by lever power. The wheels of their buggies and trotting waggons are frequently made of one hoop of hickory, surrounded by a light tire. These vehicles are remarkable for their lightness and the great diameter of their wheels, which of course is doubly advantageous on bad roads, but they have no pretensions to elegance of shape, and the height of the fore-wheels renders it impossible for them to turn under the carriage; this would never do in our crowded streets and narrow lanes, but does not much matter on the broad highways of a new country, and gives them a great advantage in going ahead. Some of their covered carriages resemble an umbrella on wheels more than anything I can compare them to.

The world is a good deal indebted to America for improvements in the method of breaking horses. I think it might also learn something from the mode of training them as practised there; the first lesson that a colt learns in America is to stand quiet when haltered to a post by the hour together. Now almost every house in a street is provided with a post and a ring to it, so when a person drives up to a door, he requires no servant or street boy to stand at his horse's head, but leaves him quite safely fastened by a strap attached to the snaffle, and on market days or on Sundays when they drive to church, instead of putting the horses up, they are left in groups thus fastened; here is a great saving of trouble and expense. American horses are generally trained to bear on the rein; the faster you want them to go the harder you hold them in, and that enables them to lay out in the surprising way they do in their famous trotting matches. It is dangerous to talk in England of the speed the first-class American trotters, such as Ethan Allen or Flora Temple make. As I could not have believed the pace unless I had timed them myself, I will maintain a prudent silence about it. As soon as you slacken the reins the horse slackens his pace; and when, in driving, you throw up the reins, he is severely punished if he does not instantly stop and remain quiet. The horse is thus taught to know his master's wishes without the use of the whip, and indeed he is governed by the voice much more than amongst us; his harness is more simple, and blinkers are in a great measure dispensed with; by these plans much of the trouble and attendance that horses in England require is saved. Every farmer drives his pair or team as he calls it, but hardly any one thinks of hiring a man to look after them. In the Northern States you seldom see horses driven singly; a "one-oss concern" is there one of the strongest expressions of contempt.

A word now about farmer's tools. These, perhaps, do not equal ours in high finish, but excel them, I consider, in the high excellence of combining cheapness with efficiency; one of our largest plough manufacturers has acknowledged to me that he cannot compete in price with the American ploughs; and I think these catalogues of some of the principal American houses, which I will leave here, for the present, for the inspection of any one who may be interested in the subject, if compared with those of English houses, will show that American agricultural tools generally are cheaper than English ones. I know not why this should be, because, though it is true that wood is somewhat cheaper in America, yet all their steel comes from England, and is therefore correspondingly dearer; skilled labour, also, is more highly paid than in England, nor ought the difference in the price of wood to be very material, for the great houses in New York, Massachusetts, &c., procure most of their wood ready turned, or cut out, from establishments in Maine, and we might go to the same source for our supply.

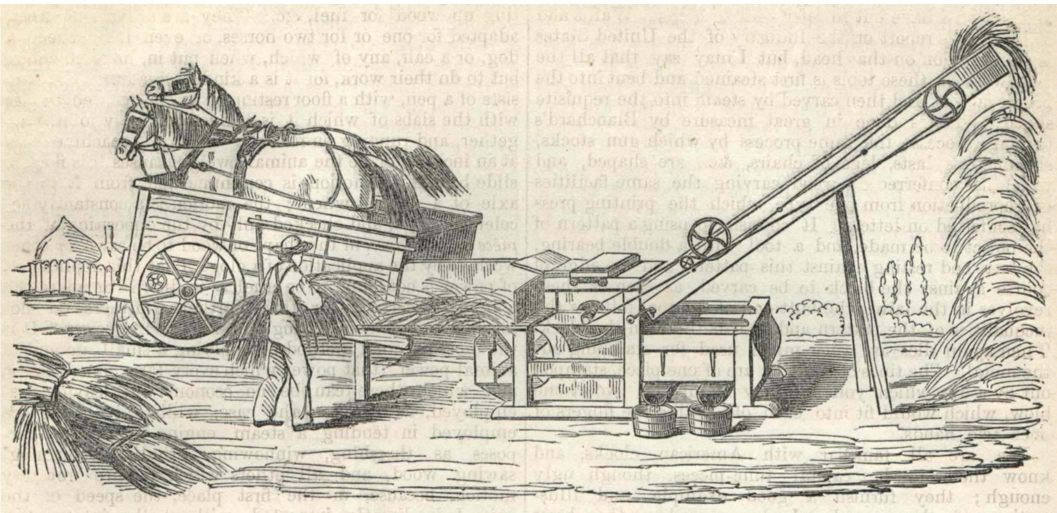
I do not believe these tools are inferior in essential qualities to English tools, though in high finish they may be: at least as much steel is used in them as in the English implements, and the shrewd Yankee or Canadian farmer would soon find out the difference, and give the preference to English tools if they deserved it. The purchaser there is allowed to put an implement to any fair test he chooses before buying it; this fork, for instance, which is so light and handy, may be subjected to the test of swinging round and dashing it against the floor, thus. It cost one dollar—an English one, I suppose, would cost five shillings. Now I think two considerations go far towards explaining this greater cheapness:—one is, the great advantage taken of machinery in the manufacture—the second, the neglect of that high finish and polish of non-essential parts, besides, painting and decoration, which is carried to so superfluous an extent by our manufacturers, absorbs so much unnecessary labour, and is given solely for appearance sake. I am aware that an inferior and cheap class of tools is made for the colonial market, but I know, to my cost, that, in these, essential qualities are apt to be sacrificed.

The wood-working machinery of America has, for some years past, excited the admiration of scientific men on this side the water. It is too large a subject to enter into here, and indeed I have but to refer you to Messrs. Wallis and Whitworth's report on the Industry of the United States for information on that head, but I may say that all the woodwork on these tools is first steamed and bent into the proper curves, and then carved by steam into the requisite shape. This is done in great measure by Blanchard's turning process; the same process by which gun stocks, shoemaker's lasts, legs of chairs, &c., are shaped, and which has conferred on wood carving the same facilities of reproduction from one type, which the printing press has conferred on letters. It consists in using a pattern of the object to be made, and a tool with a double bearing, the butt end resting against this pattern, and the edge of course against the block to be carved, as each of these revolves in the lathe, the butt end of the tool follows the inequalities of the pattern and repeats them on the block. Then again dies are very much used for stamping out the metal. The tines of this fork are of one piece, stamped out by a die, which you see may stamp out two at one blow, which would fit into each other, like the fingers of ones two hands.

We are all familiar with American clocks, and know them to be capital time-pieces, though ugly enough; they furnish a good example and illustration of the remarks I have made; the brass works are all stamped out by dies, and in this manner they can be made so cheaply as to defy competition from this side of the water. The New Englanders are now carrying this plan to a certain extent into the manufacture of watches; and this machine-made watch, which you will allow is sufficiently ugly, is, I assure you, a very good time-keeper.

These offer a few examples of the great strides which the English race in America is making towards the emancipation of industry from merely mechanical employment, and I think it behoves English manufacturers to profit by such examples, for on the one hand a great danger, on the other a great and prosperous future, is opening before them. If they allow themselves to be beaten in the race by American ingenuity, they are in imminent danger of being supplanted, even in our own colonies, as well as in other distant markets of the world by their keen competitors; on the other hand, under the altered relations of the planting states of America, which form the Southern Confederacy, these great creditors of ours would naturally be inclined to come to our market for the supply of their mechanical wants, unless deterred by the dearness and unsuitableness of our goods.

I will now draw your attention to a few of their agricultural tools which present any noticeable difference from ours. I will not dwell on the reaping and the mowing machines, and the combined reapers and mowers, which would form subject enough for a separate paper. There is an endless variety of these, and a vast amount of ingenuity has been developed in their improvement. But I believe that not only may Scotland claim the merit of their first invention, but English makers have, after all, fairly taken the prize in bringing them to their present state of perfection, certainly in the opinion of English judges, and even in that of some Americans. These machines are largely used in the prairie states, but in some parts of the country they are scarcely seen, and this grain scythe and cradle is used instead. It is a very perfect implement of its kind, and to see a number of neighbours joining in a Harvest Bee to cut down the grain with this cradle is as pretty a sight as can be. It gathers in so much at each stroke that a couple of cradlefulls form a sheaf, which saves much of the labour of tying; when cut the grain is generally very speedily threshed out in the field, the heat of the summer climate, and consequent dryness of the grain admitting of this, and the power generally used for threshing it in the Northern States is this horse-power, the great advantage of which lies in its portability. It is called a railway, or an endless railway horse-power, and is used for most of the stationary work on a farm, threshing, winnowing, chaff, and corn stalk cutting, cutting up wood for fuel, &c. They are of various sizes, adapted for one or for two horses, or even for a sheep, a dog, or a calf, any of which, when put in, have no choice but to do their work, for it is a kind of treadmill. It consists of a pen, with a floor resting on an endless web, or else with the slabs of which it is composed merely jointed together, and running on rollers. When the machine is set at an inclined plane the animal's weight causes this floor to slide back, and motion is communicated from it to the axle of a driving-wheel; the motion is a constantly accelerating one, and checked only by the opposition of the *pièce de resistance*, in the shape of wood to be sawn, or other work, or by the application of a clog. That this application of power is not found to be cruel, or to distress or injure the animal, is certain, for the Northern farmers do not hesitate to put their driving horses into "the power." It is the most effectual method of applying a small amount of animal power, (that power which every farm must possess, and which there can be no economy in leaving unemployed, as is often the case, whilst all hands are employed in tending a steam engine,) to such purposes as threshing, winnowing, grinding, churning, sawing wood, and all others which require rotatory motion, because, in the first place, the speed of the animal is directly imparted, without the intervention of gearing, to the axle of the driving-wheel, whence, of course, it is multiplied at the periphery where the band travels. Here is a woodcut of this horse-power. The advantages claimed for these horse-powers over the old lever ones are:—1st. That in this the speed is directly applied to the axle of the band-wheel; in the other, the horse walks a circuit of some 18 or 20 yards, in order to give one revolution to the axle, and this loss of speed has to be recovered by a complicated system of cog-wheels and gearing. 2ndly. A horse walking in a mill pulls, not at right angles to the pole which forms the radius of the circle, but within the right angle, viz., in a straight line towards a point in the circumference a-head of him, hence the line of draught falls within the circle, and forms an acute angle with the pole; this involves a loss of power in duplicate proportion to his thus diminished distance from the centre of motion, because the power is not wholly lost, but is mischievously exerted in pressure on the centre, and consequent increase of friction. 3rdly. The tendency of the motion in the American machine is to be cumulative, *i.e.* constantly accelerating. Were it not for the resistance of the work, this acceleration would very quickly shoot the animal out of the pen backwards. Advantage can be taken of this to give a few seconds to get up speed. The machine can be stopped, and the animal rested, by applying a clog to the wheel. But, after all, the great recommendation of these powers is their portability. If a crop is to be threshed at a distance from the homestead, "the power" is put on wheels and drawn to the spot by horses, which when arrived there are put in to work it, or in rainy weather when neither horses nor men can get on the land, and the former would be eating their heads off in the stall, and the latter lounging in the barn, "the power" is put into this barn and set to a job of chaff or root cutting, wood sawing, &c. This is an advantage that I am sure farmers will appreciate. The well-understood economy of these powers has caused them quite to supersede the old lever ones on the smaller farms of the Northern States, for steam is but seldom used there. The roughness of the roads would prevent itinerant engines from travelling, and besides, it is quite an axiom amongst engineers there that less than 5-horse power in steam does not pay. Within that limit of 5-horse power, however, Ericsson's caloric engine is coming into great use, and is found very economical. On the large plantations of the south, and the extensive farms of the west, the old horse works are retained, because they admit of the application of a much larger amount of power for threshing, &c., than do these railway machines. The capacity of these is said to be, for two horses, about 175



Horse-power, with Thresher and Straw Elevator.

bushels of wheat a day, thrashed and winnowed, and the computation of cost is 2½d. per bushel. They are even used on railways to cut up the wood for fuel. I fully believe they would be found very convenient on our smaller farms, and in particular in the colonies, where steam is out of the question. I some time ago sent one out to Australia, and I believe they are coming into use there. If any of my hearers wish to see how they work he may see one at the livery stables of Mr. Yeoman, in Guildford-street, made by a Mr. Hartas, of Pickering, in Yorkshire, who has patented an improvement in the joints that connect the slabs forming the floor. I may add that these "powers" have been reported on favourably by Mr. Amos, the Consulting Engineer of the Royal Agricultural Society, who was employed by that Society to examine them. He assigned them a superiority of 16 per cent. over the lever powers, in the effective duty performed by each. That Report may be seen in the Royal Agricultural Society's Journal for 1859, Vol. xx., part 1.

The straw from the threshing machine is often conveyed to the rick by an endless band or web carried over a roller on the threshing machine, and another roller on the rick, and run by a belt from the horse-power, and the straw is thus delivered with the aid of only one man on the rick to distribute it. The cost of one of these straw deliverers is only about 15 dollars, £3. Now, I saw at the agricultural show at Warwick, an English machine for effecting the very same purpose, most elaborately, and no doubt beautifully, constructed, but costing £51. It is evident that whilst it would be economy to purchase the one, it would be the height of extravagance and folly to buy the other.

Another labour-saving implement, commonly used in some parts of the States, is the unloading fork, for raising hay to the top of a stack, or as in Pennsylvania, for storing it in the large German barns so common there. It is shaped like a rake with 4 tines, and is capable of raising a couple of cwt. at once, or a pair are used together, which will carry up 4 or 5 cwt. between them. A rope attached to this fork is rove through a block, generally a patent block, *i.e.*, one with friction rollers; the block is suspended by a tackle over the centre of the stack, the fork or forks are pressed down into the load, and when all is ready a horse attached to the other end of the rope moves on and thus swings the load up to the top, where it is deposited by twitching a cord which releases a catch on the rake handle, as it might be called. This is very simple, but may be better understood by aid of this model. The friction rollers round the pin of the block, besides easing the working of it, are a great safeguard against ignition, and I must observe, that there cannot be a better example of a labour-saving instrument than is afforded by these anti-friction blocks, which are so much more generally used in the American merchant service than in ours; it is the employment of these and similar contrivances for saving the crews' strength which enables the Americans to sail their ships more cheaply than we do, and so steal from us so much of the carrying trade of the world. The blocks are certainly dearer, but I should suppose the extra expense would be saved in one single voyage in men's wages.

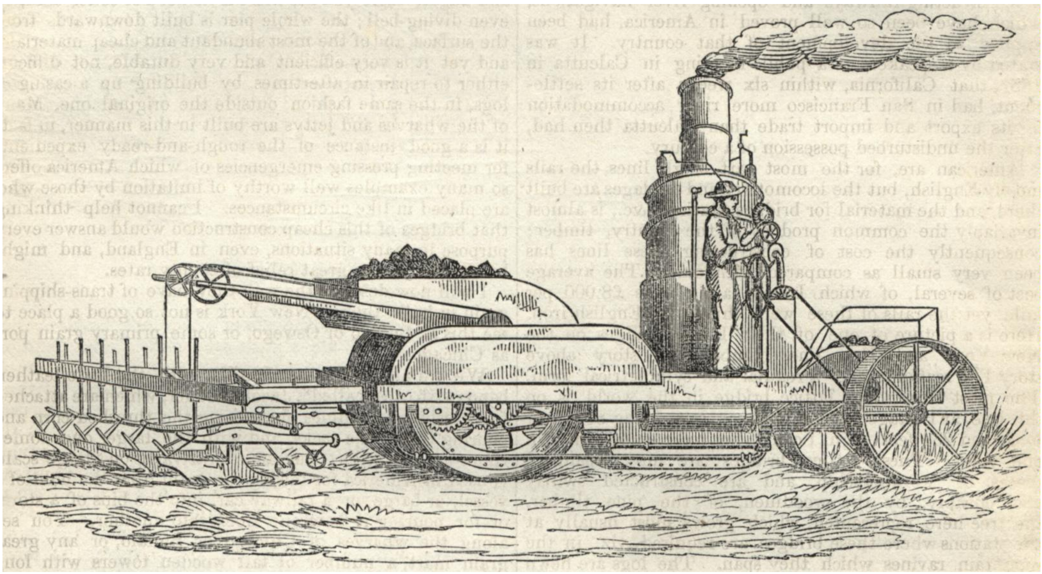
The hay in New England is generally stored in what are called hay barracks, *i.e.*, under a moveable roof, which slides up and down between four poles, like the posts of a four-poster, and can be counter-balanced over these. This roof lasts for several years, and saves an annual thatching, it is also a most convenient covering in rainy weather during hay harvest. This kind of hay barrack, I may observe, is used in the north of England.

The ox shovel is another implement in great use, it is a cast iron trough like a coal scuttle, with handles like those of a wheelbarrow, and the traces are attached rather behind the centre so that when drawn forward, if the front edge catches the ground, it is pulled over. This implement is used in removing rubbish, dung-heaps, dirt, &c. A horse or ox being attached to it, the driver bears a little on the handles and guides it under the rubbish so as to fill it; as soon as he wishes to desposit the load he jerks up the handles, and the animal continuing to pull turns it over.

The potatoe digging plough is yet another simple but efficient implement, whereby saving of toil is attained, it buries itself well under the potatoes and turns them out, whilst the earth passes through slots in that which without these slots would be a double mould board. Now, undoubtedly, some potatoes are cut or left in the ground by an implement of this sort, but the saving of labour in a country where labour is highly remunerated is worth far more than the lost potatoes.

Here is a simple form of one or two horse mill, which is much used for coarse grinding, as for instance, grinding the corn cob and corn together for feed. It is of iron, with steel grinding surfaces, and is on the principle of a coffee-mill. It is said to grind about eight bushels per hour. I have here a section showing its construction. These might, no doubt, be made more cheaply in England than America, where they cost 55 dollars=£11. I should like to recommend them to the notice of Birmingham manufacturers. I must remark here that this way of giving the cob with the maize for feed is much safer than giving the corn alone, for it is a heating food when unmixed. I am glad to see the importation of that valuable grain into England is annually increasing, but the precaution should be taken of mixing it with other food.

The subject of American ploughs is too large a one to enter on now; they would not do in England, but are better suited than, the more expensive English ones to American requirements, and are therefore probably better adapted than ours for the work to be done in many of our colonies. Some of them were exhibited in the Exhibition of 1851; these catalogues show a great variety of patterns which are in vogue in different parts of the States; those in the Southern States are very primitive home-made affairs; in the German Settlements, the German left-hand plough is retained. In the Prairie States, generally, the whole share and mould-board are of steel, as iron will not scour in the tenacious alluvial soil, and would soon get clogged; but there is one kind of plough which I must draw your attention to—the prairie steam-plough—of which this is a woodcut. It is, you see, a locomotive machine, not, like Fowler's, a traction one drawn by a fixed engine. It consists of a tubular engine, of about 18 horse-power, which acts, not on a pair of driving wheels, but, in their stead, on an iron cylinder, which is followed by a gang of six ploughs. The cylinder is about 6 feet in width, and 18 in circumference, studded with projecting knobs, to make it bite the soil. The tender, with coals, is placed over this cylinder, for the purpose of pressing these knobs into the ground, and obviating the danger of the machine being anchored by the ploughs, and the cylinder revolving in one spot. The knobs are so inserted as to be capable of being drawn back within the cylinder during its progress over roads—retractile, in fact, like a lion's claws. Arrived on the prairie, which, with all its tangled mass of grass and roots, is to be broken up for the first time since the creation of the world, the driver directs the engine by means of a tiller-wheel, towards some landmark far a-head. The cylinder rolls down the tall vegetation before it, and the six ploughs, placed diagonally, in the rear, tear up the sod and lay it over in six parallel furrows. Now this power-plough is not generally adopted in the West; the majority of the settlers are too poor to take advantage of such means; besides it has been invented too short a time (only two years) to be yet pronounced a decided success, but it is coming into use, and I know that the opinion of some of the most competent engineering authorities there is highly in its favour, as far as regards this sole object of tearing up the stubborn prairie sod for the first time. This is an exceedingly laborious operation, the resistance opposed by the stiff tangled mat of roots and grass being immense and worthy the intervention of the *Deus ex machinâ* in the shape of steam. When once broken up, the difficulty and the need of such powerful means cease, but there is still unbroken prairie soil sufficient to employ many of these ploughs for years to come. I will point out one or two of the advantages of this mode of ploughing; in the first place the work is done with great regularity by employing 6 ploughs in a gang, whereas, when such rough land is opened by a single plough, islands of unturned ground are left at every few yards. Secondly, part of the resistance is relieved by the rigidity of the machine itself; this may be best explained by a diagram. When a single plough passes through soil the resistance is necessarily distributed on each side, partly on the sod turned over, partly on the land-side; pressure and counter-pressure being equal, a large part of the force is absorbed in unprofitable friction on this land-side. But when six ploughs are driven in a gang rigidly fixed in a frame, I think it must be allowed that only a small proportion of the power can be absorbed and lost in this friction; this, however, is perhaps rather a question for an Agricultural Society to determine. But the great advantage of this plough in the far west, or any unbroken champaign country, consists in the immense saving of time and labour that it is calculated to effect. Quick and large returns are of course the great object of the settler's exertions, and one of these ploughs, hired for a few days, would prepare a larger extent of ground for crop then he and his boys could get ready during the whole of the sowing time.



Prairie Steam-plough.

I might mention other farm implements which display ingenuity and combine cheapness and efficiency, such as the automatic cheese press, in which the weight of the cheese itself is made to act on levers which give it the requisite squeeze; the Pennsylvania turn-over, or hill side plough, a most admirable contrivance, the wooden turnover hay rake, &c.; but time is getting on and I wish to direct your attention to another class of objects, relating to the transport of produce and of passengers.

American railways for the most part, might be considered rude when compared with our highly finished and costly lines, but they are suited to the means of a young country, and are admirably adapted for opening up new districts, which would not have been opened up to this day if the costly system established in England, and that has been extended from England into some of our colonies, had been adopted there. How different would be the position of India at this time if the simple and rapid modes of constructing railways and opening river navigations, which have been so well proved in America, had been applied to the development of that country. It was stated by a speaker, at a public meeting in Calcutta in 1857, that California, within six weeks after its settlement, had in San Francisco more river accommodation for its export and import trade than Calcutta then had, after the undisturbed possession of a century.

American are, for the most part, single lines, the rails mostly English, but the locomotives and carriages are built there, and the material for bridges, stations, &c., is almost invariably the common product of the country, timber; consequently the cost of constructing these lines has been very small as compared with ours. The average cost of several, of which I have a list, was £8,000 per mile, yet the rails of these were chiefly of English iron. Here is a picture of one of their lattice bridges on the New York and Erie line, climbing up story above story-like scaffolding, of a regular and symmetrical form. The most stupendous lattice bridge in the world is on this line, at Portage, on the Genesee, but, being 800 feet long, and 234 feet high, I could not have embraced it in one view. These lattice bridges are most beautiful pieces of workmanship, and are constructed swiftly and cheaply, by the woodmen, of the pine timber, the tree here represented, which grows most usually at the stations where these bridges are required, viz., in the mountain ravines which they span. The logs are hewn down almost entirely with the axe. The bridges over the rivers also are almost invariably of wood, the roadway being suspended from arches formed of several concentric courses of timber, the joinings in the several courses alternating; they are of exceedingly bold spans, and that form of construction, you will observe, affords a clear unobstructed space between the piers for the passage of ice or drift wood in a swollen state of the stream. They are usually covered with a high pitched-roof, to prevent accumulation of snow, and boarded in for protection from weather. This form of bridge may be seen commonly in Switzerland and the Tyrol. The great danger to these wooden bridges, and particularly the railway bridges, arises from their liability to be burnt. Not a winter passes without the destruction of many of these by fire. The cinders and sparks from the engine fall into crevices, and it is almost impossible to extinguish the fire in winter when the water is all frozen at a temperature below zero. Not being an engineer, I cannot pretend to present more than a popular view of these and other engineering matters, and must once for all deprecate any severe criticism from professional men.

Now for the manner in which the foundations of these bridges are laid, and the piers built up. It is usually done by what is called in America, crib work, of which this is a rough model, and is effected in the following manner:—A survey having been taken of the contour of the bed of the river, a raft or barge load of pine logs is brought to the spot and four of them are formed into a parallelogram, cut away so as to be conformable to any inequality of the bottom; on these others are laid notched and fitted and securely bolted to them; a floor of stout slabs is laid across these, which is then weighted with stones so as bring it down to the surface of the water, this box-shaped pen is anchored on the spot selected for the pier, and the process is carried on of building it up, and as it rises sinking it with additional stones flush with the surface of the water till the bottom takes the ground; the interior is then filled in with stones, and a solid and very durable pier is formed, its durability being due to the valuable property which the pine possesses of remaining for a great length of time under water without decaying. Perhaps the turpentine and resin which it contains contribute to this durability, but our own elm, which contains no resin, has a similar duration under water, though it decays rapidly in the air. The logs of which these cribs are built, are roughly squared pine logs, and the whole workmanship is effected with no other tools than the axe, saw, and auger. Here you see there is no need of coffer-dam, or even diving-bell; the whole pier is built downwards from the surface, and of the most abundant and cheap materials, and yet it is very efficient and very durable, not difficult either to repair in aftertimes by building up a casing of logs, in the same fashion, outside the original one. Many of the wharves and jettys are built in this manner, in fact, it is a good instance of the rough-and-ready expedients for meeting pressing emergencies of which America offers so many examples well worthy of imitation by those who are placed in like circumstances. I cannot help thinking that bridges of this cheap construction would answer every purpose in many situations, even in England, and might be adopted to the great relief of county rates.

I will now describe the way they have of trans-shipping grain in bulk, though New York is not so good a place to see this as Buffalo or Oswego, or some primary grain port as Chicago.

We are all, I dare say, familiar with the little leather bands with caps, called a Jacob's ladder, which are attached to threshing machines for raising the threshed corn and pouring it into the sacks, and with the larger ones sometimes used in mills; the same contrivance on a large scale is used in America for raising the grain from the hold of a vessel, or barge, or a railway car, into the bins of a store, or for pouring it from one hold into another. You see along the wharves of Chicago, or Buffalo, or any great grain mart, a number of tall wooden towers with long wooden shafts dangling from them like a pump handle; if you watch them you will by-and-bye see a barge or a grain-schooner warp alongside, and this same pump handle rise over the bulwarks and dip into the hold just as an elephant might be supposed to dip in his proboscis. This wooden shaft you will then divine, contains an elevator, which consists merely of a number of little buckets, fixed on a belt, which is driven by steam. They dip into the grain and carry it up into the building, where they discharge it generally into a hopper, which, after receiving a certain quantity, lets it down into the bin or into a shoot, which discharges it straight into another vessel, at the same time ringing a bell, or moving an indicator; the grain is thus without more trouble measured off in transitu. Let us see now how this grain arrives at New York. Whether it be wheat or corn (by which they always meant Indian corn or maize), it is very probably grown in Canada or in the Great Prairie States of the West, Indiana, Illinois, Iowa, Winconsin, &c., 800 or 1,000 miles west of New York. Whether it comes over land or water it is entirely dealt with in bulk. The low price which it bears would not admit of all the paraphernalia of bagging. It is conveyed from the farm to the nearest railway or canal in a box formed of tongued and grooved boards which form the body of the waggon; it is shovelled out into the barge at Chicago (we will say), run through an elevator into the hold of a grain schooner or propeller at a very trifling charge; these convey it through the great lakes, more than 800 miles in all of fresh water, to Buffalo. There again it is transhipped, or it goes on through the Welland Canal and Lake Ontario, 150 miles farther, to be transhipped at Oswego into the barges of the Great Erie Canal to Albany on the Hudson, whence it has to descend the river a distance of 150 miles, the lower part of which is a broad estuary several miles in width. How is this performed? Why, 20 or more of the barges, each of which is a boat of 70 tons capacity, are formed into a raft, with a steam propeller in the middle, and the whole mass, like a floating island, undertakes its adventurous voyage to New York. This appears a dangerous enterprise, but I believe accidents are of rare occurrence. One passes a large number of these floating islands in steaming up the Hudson. The entire expense of conveying a bushel that whole distance thus, is only 7d.

The steam ferry boats, which ply in such numbers about New York, Philadelphia, &c., are constructed in the same manner as their river steamers. On a sharp, narrow hull is placed a platform, 50 feet in width, supported out on brackets, and extending to a line with the outside of the paddle-boxes, the paddles being of great width; on this platform are built two handsome saloons, the best being called the ladies' saloon, into which no man has a right to intrude, except in company with a lady; this precaution is necessary where republican prejudice does not allow of the distinction into first and second class. I assure you the ladies' saloons, in some of these boats, are most elegantly fitted up with mirrors and handsome furniture, and for all this splendour the fare is about 1d. Between these saloons is a gangway wide enough for a double line of carts and carriages. A platform, accommodating itself to the rise and fall of the water, enables you to drive on board with perfect ease, and the little dock into which the boat glides at each side is formed of piles, hinged on moorings at the bottom, which yield to the vessel like reeds as she enters, and prevent any violent concussion. These ferry boats are 100 to 120 feet long, and 50 wide. You see the pilot-house aloft and the walking-beam.

I have been asked why we have not such in similar situations in England; at Liverpool, and other places, it is a case of vested interests. The right of ferry belongs to a Corporation, forsooth, which has the privilege of preventing people from crossing in any boats but their own, so they have no interest in improving the transit. I have been reproached over and over again in America with our dilatoriness in adopting these and similar obvious improvements, and the only answer I could make has been that whenever any useful improvement is suggested in England, a lawyer stands in the way to uphold some ancient and time-honoured abuse.

The passenger steamers on the Hudson are very noble boats; but few of our ocean steamers surpass in size or power such vessels as the *Isaac Newton*, or *New World*, or *Daniel Drew*, which have a length of about 400 feet, and the same broad platform for a deck which I have described in the ferry boats, on which are built handsome saloons, fitted up with every luxury, so that the greater part of the space below deck can be appropriated to cabins and berths. Above all tower the paddle boxes, encasing the wheels, 45 ft. in diameter, (those of the *Great Eastern* are but 60 ft.) and between these moves up and down very leisurely the massive beam of the engines, commonly called the walking beam, from its peculiar movement resembling the act of walking or striding along. It must be remembered that each stride of this beam indicates an entire revolution of the great paddle wheel, but until I bethought me of this, there seemed a great disparity between the slow motion of the beam and the rapidity with which the great ship was shooting onward. You will observe the truss beams extending fore and aft; these are to support the great length of the ship, for without these a wooden vessel of such dimensions, so long and so narrow, would infallibly soon break her back. You will observe, also, the masts as they are called. These are not what we mean by masts, but are strong upright timbers, with chains passing over them, which help to brace the vessel together: they thus form part of the frame, whilst at the same time they are useful for flying the colours from.

There cannot be a better type of the go-ahead character of the Americans than these steamers. In descending the river with the current they often run a neck-and-neck race for many miles with the railway trains on the parallel line on the bank, having the advantage over the train of running a pretty straight course without following the sinuosities of the banks. You will observe the glass case on deck; it is the pilot house, placed here well forward and aloft, whence the pilot can see almost under the vessels bows, and steers by chains acting by a cross-bar on the rudder.

There are various other American inventions and appliances which I should have been glad to describe in detail did time permit, but the subject is far too wide and extensive to be embraced in a single paper, and I can only point to these diagrams on the wall, and assure you that I shall be happy as far as is in my power to answer any questions respecting them. They relate, as you observe, to docks, particularly the floating docks for which the Americans are famous; Derrics, such as have been seen of late years on the Thames. Unloading gear for shipping, railway engines and carriages, tramways and tramway cars, such as are now being proposed in this country by an American gentleman with the appropriate name of Mr. Train, (excellent things are these tramways for relieving the traffic of crowded cities); canal slides, and canal boats built in sections, steam boats, and pilot boats, &c.; and finally modes of house-warming adapted for very cold climates. Besides these, I have some little models and articles of household economy which I shall be happy to explain to anyone who may take an interest in them. I must not trespass longer on your patience, and only regret that time does not admit of full justice being done to my subject.

DISCUSSION.

Mr. E. Chadwick, C.B., would offer his congratulations on the advance shown by the fact that here was a travelling Fellow of Oxford bringing home, not the means of fostering an indolent architectural copyism by the display of the symbolism of effete paganism, not mere dead matter of happily bygone times, dug up for the literary recreation of the cloistered few, but sound practical information, for the advancement of the productive arts, contributing to abundance amongst the many,—useful information, not concealed in the dead Latin language, as required from the travelling Fellows of Cambridge, but given clearly in the vernacular. With the thanks of the meeting for this important example, might be coupled a suggestion to the University authorities, that if there were, as it was to be hoped there might be, more such Fellows collectors of nationally useful knowledge, this Society would be a place, and this a mode of displaying it, for the advantage of the public in England, our colonies, and the credit of the University. Of the general matter introduced into the paper, that which adverted to the education of the American population, as one proof of the progress of the Arts, was at this time deserving of more extended attention. The like testimony to the beneficial operation of education, in promoting the Arts in America, was borne by Mr. Whitworth when he acted as a commissioner from England at the American Exhibition held at New York. To the better education and greater intelligence of the work-people, he ascribed the fact that they understood the advantages of machinery in relieving them from the drudgery of manual labour, and that strikes to resist its introduction were unheard of. Two elements, however, combined in America for the extension of labour-saving machines. One was the scarcity and the high price of labour; another was the training of the population arising from the circumstances in which the people were placed, as well as from their school education. He (Mr. Chadwick) was always favourable to advances in wages, even to heights deemed considerable, and for this reason amongst others that it was the only means by which inventions in the arts and labour-saving machines could be brought rapidly into general use. Nearly a quarter of a century ago the successful working of the reaping machine had been demonstrated in action to intelligent men ; but intelligence did not alone suffice. It was only the necessity occasioned by scarce or high-priced labour which led the agricultural mind to look seriously and practically to the means of saving labour. In respect to book instruction, American educational reports showed that a large proportion of these schools and those in the remote districts especially, were as bad in all respects as any in this country, and it might be doubted whether their best schools came up to our best schools. But the American children were earlier made to shift for themselves; to ride and drive earlier, and were made handy in domestic service where labour was scarce. Educational reports shewed that in many districts their school attendance was interrupted for long periods, and was on the whole less, yet their intelligence was declared to be on the whole greater. Let them compare the condition of an English lad at school, at desk work, all day long up to his thirteenth or fourteenth year, with that of an American lad who had been a much shorter time at school, but who had been obliged to use his hands and faculties in driving, or riding, or in work in the fields, although he might have had less schooling during the same time. He would repeat what he had ascertained upon the authority of machinists of long experience and observation, that there was in agriculture as much good invention unused as any that was in use, but it was unused mainly from ignorance combined with clumsiness, ineptitude, and incompetency to use it. Upwards of six thousand lives were lost every year, chiefly by the inept use of steam and other machinery. But witnesses had declared to him that the majority of the accidents arose not simply from the want of the intelligence imparted by common book instruction, but from bodily ineptitude and clumsiness. Untrained men—he meant bodily untrained men—were dangerous for trained men to act with. They did not pull together, or lift together, and hence serious danger arose. Now it was proved in respect to what were called half-time scholars, that those who were only half-time in school and half-time engaged in some manual or industrial occupation, in which they had to act as well as to think, or who were under some physical training, such as the excellent physical training of the naval and military drill, acquired precisely that sort of handiness and practical intelligence which was ascribed to the better class of native American artisans. These qualities of the English half-time scholars taught in the larger British or good National Schools, were so marked in Rochdale as to occasion them to be preferred by machine makers and others, not only to the pupils whose whole time was given in the same schools to book instruction alone, but to those youths who received the more expensive middle-class education in the country, and who were offered by their parents with premiums. These latter required more trouble to guide their hands and train them to act, as well as to inform their minds. The book instruction of the half-time scholars was proved to be equal, paradoxical as it might seem, to that of the full-time scholars, whilst their aptitude in applying it was greater. The evidence collected on these points, as a large and distinct educational question, should be well considered. From that evidence, when duly promulgated and considered, it would, he believed, be seen that to obtain due progress in the perfection and general use of labour-saving machines in England, it would be requisite to ensure systematised bodily as well as more practical mental training, such as were extensively imparted, without system, by circumstances and conditions in the United States.

Mr. S. Sidney said the few observations he would offer would be confined to the agricultural portion of the subject brought before them in the paper. It was impossible to overestimate the advantages which the agriculturists of this country had derived from the ingenuity of the Americans. If by the Exhibition of 1851 they had gained nothing more than the introduction into this country of the mowing and reaping machines, it was an advantage to the nation, the value of which it was impossible to over-estimate. But, considering the various agricultural implements in use, it was necessary, in order to do justice to both countries, to regard the different conditions under which such implements were employed here and in America. With regard to the mowing machine, he had heard it asserted that it was invented more than twenty years ago; he believed that it was nearer thirty years ago since Mr. Bell first invented a mowing machine; but he doubted whether that implement had much resemblance to the machine which was most in use at the present time. Mr. Bell's machine, however perfect in itself, was not used in this country for a considerable period, for the best of all reasons, that we did not want it. Machinery would not be adopted as long as there was manual labour available to do the work equally well and equally cheaply. At the time the mowing machine was first invented labour was cheap; a large number of men could be obtained at any moment, and for very low wages, to get in the crop, and when the harvest was over they could be discharged. Under such circumstances occupiers of land were not likely to embark in an expense of £30 or £40 for a mowing machine. There was another reason why it had not been more generally used. Mr. Crosskill, who had done most to render the machine fitted for use here, had stated that the original machine could only be used with advantage on level surfaces, and therefore the American invention had to undergo considerable modification to render it fit for general use in this country; added to this our crops were heavier, and our roads better. In the early state of society in America, the great point was to get the machinery made as cheaply as possible. The crops were light, the roads bad, and it was of little consequence if the implement lasted only for a short time; but in this country the crops were so heavy that scarcely any of the machinery that came from America was sufficiently strong for practical purposes here, while the goodness of the roads rendered it worth while to make a more finished and durable machine. The same remarks equally applied to the threshing machine. When the American machine was put to work in this country, from the crops being so much heavier, it broke to pieces; and that which was a good and cheap machine for America was a very dear one for this country. The introduction of the reaping-machine was followed by that of the mowing machine, and he must say, so far from agreeing with the remark in the paper, that there was a disinclination on the part of the agriculturists of this country to adopt inventions that were really useful, nothing, in his opinion, was more astonishing than the avidity with which they were taken up as soon as they were proved to be practically valuable. Having been in Dorsetshire during the last harvest season he was astonished to see the extent to which the reaping machine was used even in the most retired districts of that county, and it was the same all over the country. In a recent discussion at the Farmers' Club, it was stated by a large farmer that, so far from the agricultural labourers looking upon the reaping machine as an enemy, they regarded it as a great friend. But when they came to speak of ploughs, a much larger question was opened up, and upon that subject he must be permitted to remark that he thought Dr. Eddy was not so familiar with the manufacture of agricultural implements in this country as in America. Twenty-five shillings was by no means a remarkably low price for a plough. They could get ploughs in plenty at twenty-five shillings each, and there was a very large business done in this country in the export of the "guinea plough." Dr. Eddy, in a communication to the *Journal of the Royal Agricultural Society* made a comparison between the £4 and the £2 ploughs; but under some circumstances the £4 plough was the cheaper implement. The American plough was suitable for that country, where they did not care about a thing lasting long; but it had yet to be shown that those implements could be used with advantage in this country, where durability was considered. At the Agricultural Exhibition at Vienna, a large number of ploughs from different countries were exhibited by Mr. Smallbones, and the result of trials of the different implements amongst the German and Hungarian farmers, was to give a strong preference in favour of the English plough over the American. They found it altogether a better and more convenient implement for the circumstances of the country. This was a subject which must be considered entirely with reference to the circumstances in which they were placed, and they must not be too much carried away by the idea of cheapness; nor must the class of machines constructed in this country to suit the tastes and ideas of wealthy amateur farmers, who would not fancy a thing unless it was costly, be taken as fair specimens of the machines used by the generality of our tenant farmers. The best proof of the readiness of that class to adopt really valuable inventions was afforded by the extent to which steam cultivation had increased in this country. Steam ploughs could not be made fast enough to keep pace with the demand for them. Some remarks had been made in the paper upon an agricultural fork, but he did not know what were the peculiar merits of the implement introduced that evening. He had been familiar with that description of fork for many years, and he believed both forks and axes were made in Sheffield cheaper than in America, and of equally good quality. A large customs duty had excluded many of our steel manufactured goods from America, which was a proof that our neighbours considered we could produce as good an article as themselves. Parkes' steel fork had received the premium of the Royal Agricultural Society, 14 or 15 years ago, and had rapidly grown into favour. With respect to the horse threshing machine, described in the paper, its great practical value could not be disputed; but, in this country, steam was so easily available, owing to the good roads for the transit of machinery, that the steam threshing machine could be hired and the work executed in a short period of time, and at a remarkably cheap rate. With regard to the educational considerations touched upon by Mr. Chadwick, there could be no question that the time was come when they should give education to the agricultural class, which would be useful to them in the occupation they were destined to follow. No doubt one great difficulty in the introduction of new inventions was that of getting the workmen to understand them, but in this respect it was gratifying to observe that great improvement was taking place, as was evidenced by the fact of the large number of agricultural steam engines that were now in use in almost every part of the country.

Mr. Dennis begged to take exception to the remarks of Dr. Eddy upon one subject treated of in the paper, that was with regard to Ericsson's engines, which had been spoken of as being efficiently employed in America. So far as he had seen the operation of that engine, he considered it a decided failure. On the occasion of an experiment with this engine which he had witnessed, after very considerable delay in getting it into action, a ten-horse engine could only be got to work up to half-horse power. Messrs. Ransome and May had one of these engines from America, but they could make no practical use of it. He felt it his duty to make these remarks, in order to prevent misapprehension on the subject of these engines.

Mr. Wm. Hawes remarked that the paper they had heard assumed that everything in America was both cheaper and more economical than corresponding machinery in England. Dr. Eddy appeared to have given attention to these subjects in America which might have presented some degree of novelty to his mind, but it would seem he was not quite so familiar with the circumstances under which similar machinery was applied in England. A few years back Mr. Holmes, the American Consul at the Cape of Good Hope, was the first to import agricultural machinery to the Cape, with a desire to cultivate improvements in mechanical appliances in the place of hand tillage. He introduced the American plough, at prices varying from 20s. to 30s. and 40s. each. For a time they had a great run, but within the last few years the English plough had been substituted. It was dearer, but stronger and more useful; and he believed was found to be more economical than the cheap, weak, imperfect, American implement. That the American plough was got up very nicely indeed for the price he had no doubt, but he had been told by an experienced farmer that it was a great deal too weak for the work it professed to do, and even by no means an economical implement. In looking at the diagrams he was struck with one character which pervaded the whole. If the real object of machinery was to be as perfect as possible, that the greatest economy should be derived from the use of it, they must be struck with the fact that these appliances were such as were suited to a rough and primitive state of society in a new country, and not to such a country as England, where there was great scope for the display of ingenuity, and where, also, they had a choice of means for the accomplishment of a particular purpose. In the American machinery described that evening there was a display of considerable skill and inventive power, but it was not adapted for use in England without further improvement. His friend Mr. Chadwick had accounted for the mechanical genius of the American people in rather an extraordinary way. Coupled with the scarcity of manual labour, he had held that one of the reasons why we had not been so ready to introduce machinery was that the children in America were not kept so long a time at school as in England.

Mr. Chadwick said he had been misunderstood.

Mr. Hawes was glad to find that he had misunderstood his friend, inasmuch as when their present endeavours were directed to induce parents to continue their children at school for as long as possible, he was somewhat startled to find a champion of education ascribe the progress of invention in America as resulting from the children being thrown earlier in contact with the world and mechanical labour than was the case in this country. There was another view of this subject, which must strike everybody, —that was, if all these machines were so much better than those we had in use here, there must be great ignorance amongst our machine makers and farmers in not adopting them. But what was the fact? He believed the increase, both in the number and establishments of agricultural implement makers, had been greater of late years than in almost any other branch of manufacture in this country. But had they gone in the direction of cheaper and inferior machinery? On the contrary, there was greater perfection in the machinery than ever. Therefore he thought there was something wrong in the idea that American machinery, simply because it was rough and cheap, was more suitable than that now employed in this country. He, however, felt indebted to the learned Fellow for the paper he had brought before them. He hoped he would excuse this passing criticism; for, although he was not himself an agriculturist, he could not help expressing what he thought was a common sense view of the subject which had been laid before them.

Mr. John Cassell thought Dr. Eddy was labouring under some misapprehension with respect to the cost of production of implements of this description in America. He had recently paid a visit to that country, and had travelled some thousands of miles over it during his ten months stay there; and it was his opinion, as the result of his own observations, that if we were more fairly dealt with as a nation by the American government, instead of the people being dependent upon American manufactured tools, they would be large importers of those articles from this country, both in iron and steel. What had been the policy of America in this respect? When he was there, any article of this description could not be introduced, except by paying a duty of 24 per cent., which enhanced the price from 40 to 50 per cent. above what the article could be procured for in England. What had the American government recently done? Seeing that our exports from Sheffield and

Birmingham were very considerable, they had altered their tariff to an extent which was almost prohibitory. Some articles of iron paid a duty of 40 to 50 per cent., whilst on some steel goods the duty was as much as from 50 to 250 per cent. Under such circumstances it was not to be wondered at that they could compete with the manufacturers of Great Britain. He had directed his attention to the circumstances in which America was placed with regard to labour. The natural resources of America were great, and any one who engaged in agriculture there was sure to get a large return for his labour; but the policy was to enhance the price of labour by the heavy duties imposed upon imports of manufactured articles. In the matter of clothing this was especially the case. A pair of shoes which could be purchased for 11s. in England would cost 20s. in New York. They imposed these high duties as a protection to native labour, and they would not allow it to go to develope the resources of the country as it would do if there was a free exchange of commodities between the two nations. He thought great good would result from the paper they had heard that evening, and gentlemen who visited America would confer great benefit by communicating the various appliances for saving labour which had come under their observation. He was much struck, on visiting an American homestead, at seeing the various labour-saving appliances for domestic purposes. There was a machine for sweeping a carpet and gathering up the dust in an effective manner. There were also appliances for making puddings; and last, though not least, there was the almost universal sewing machine. In the printing establishments of America especially, labour-saving machinery was considerably in advance of anything in this country. There were printing machines with appliances both for laying on the sheets and taking them off when printed, which was done by boys in this country. He was particularly struck with the book-binding establishments. Piles of books underwent the process of having the edges cut whilst the attendant upon the machinery was preparing another pile for the same operation. Again, the mechanical appliances upon the railways were particularly worthy of remark. He had traversed once the Alleghany mountains by railroad, at an elevation of 2,000 feet, without separation of the carriages, the journey being accomplished with rapidity and a great sense of safety up very steep gradients. His principal object in rising was to correct an erroneous idea with regard to the power of America to produce tools and implements superior to those of England. From his own observations, he believed the English could beat them hollow if the American Government gave a liberal tariff, in the place of the exclusive, selfish, and, in his opinion, hostile tariff which had lately been introduced; and we should largely import the agricultural produce of America, and pay them back in our manufactured goods —in good tools, good implements, and good machinery.

Mr. John Anderson had given some attention, during a visit to America, to the labour-saving appliances in use in that country. He had listened to this paper with great interest, but there were always two sides to a question. In many branches of industry there could be no doubt the Americans had gone a long way ahead of us, which had, in a great measure, arisen from an inordinate demand for a particular article. In almost every instance in which they had surpassed us in the manufacture of the same description of article it was in cases where it was required to be produced in great numbers, and to such productions a large amount of mechanical ingenuity had been directed. This was especially the case in the manufacture of the particular kind of clock for which America had become celebrated; also in articles of chairs or bedsteads, as many as 500 or 600 a day being turned out in one place; and these articles being produced with an amount of mechanical ingenuity and with a reduction of cost which had rendered the manufacture a great sucess. He was also struck with the appliances for carrying out the copying principle in various branches of industry—the principle of producing a form from a copy. Whilst there, he had attributed many of the inventions he saw to American origin, but when he returned home he found that many of the appliances now developed in America had been previously introduced in this country. This remark was particularly applicable to Blanchard's gun-stock machinery and other things, the germ of which was to be found in the block machinery which had been in existence at Portsmouth as far back as the year 1803. Most travellers in America had been struck with the great progress that had been made in working in wood. That was a large question, which time would not then admit of his entering upon, but passing on to iron he would say, notwithstanding the great advances which had been made by America in the production of articles in iron of complicated pattern and workmanship, he would say the iron manufacturers of England were very far in advance of those of America; and if they were to compare a large and well-conducted engineering establishment in New York with such a one as that of Messrs. Penn, at Greenwich, the difference was extraordinary in the amount of work done. The whole of the machinery for the manipulation of iron that he saw in America was far too light, and the lathes, &c., when compared with those in England, were mere playthings. In the matter of the organisation of the workshops, he thought the Americans were in advance of us, in order, system, and in the general intelligence of the workmen, and more especially in the dissatisfaction on the part both of masters and workmen with present attainments.

Dr. Eddy, in reply upon the discussion, said in reference to the remarks of Mr. Hawes, he had distinctly stated that the majority of the appliances he had described were more fitted for introduction into our colonies than for use in this country. He was not aware that he had alleged that the American machines were better made than the English. What he said was, that some of the contrivances, he considered, were applicable to the wants of this country, especially the steam-boat ferries, and the horse-tramways, which had already been introduced, and were favourably spoken of. With regard to the generality of the agricultural implements, he had mentioned them as more suitable for use in our colonies. He was glad to hear from one of the speakers that English ploughs competed successfully with the American in foreign markets, which was a fact new to him altogether. In the manufacture of the steel fork for agricultural purposes, he thought the Americans were in advance of us in their plan of stamping it out of one piece of metal, which must produce a stronger article than when made of many pieces. With regard to Ericsson's engine, he had mentioned it as principally employed for pumping and hoisting purposes, and he believed, for low powers, it was found to be exceedingly useful.

The Chairman was sure the meeting would concur in expressing how much they were indebted to Dr. Eddy for the interesting paper he had brought before them, which, in many of its characteristics, presented features of novelty. With respect to what had just fallen fallen from Dr. Eddy, a memorandum had been put into his (the Chairman's) hand, of which, as members of this Society, they ought not to lose the record. It was to the effect that, in 1848, these forms of forks and ploughs were brought over from America by Mr. Slocomb, and the Society's medal was awarded for their introduction. They would be glad to find that the Society had been in the habit of rewarding those who introduced into this country any valuable invention which we did not formerly possess. He would have wished this discussion could have gone on longer, and that Mr. Anderson had felt himself at liberty to have extended his remarks, as he was probably prepared to have done; and he hoped he would supply the deficiency by giving them a paper at some future time, because, however valuable the paper was in itself, the discussion frequently greatly added to the light that was thrown upon the subject. He thought it was only due to the author of the paper to say that he never understood him to imply that we, as manufacturers, could not compete with and beat the Americans, or that our implements when made were not better for the purposes they were required for than those of American make. But what struck him as being the spirit of the paper was, that owing to the state of things in America, not so much owing to the necessity for saving labour, as to the general feeling that men were not satisfied with things as they were, owing besides to the state of education and society there, they were prone to look-a-head and seek for improvement. He thought to that state of things, as much as to any other, was due the fact that the germs of many great improvements had come from America. This was particularly the case in the printing machines. They had lately heard a great deal of the sewing machine. What a wonderful social reform they might look forward to from that interesting American production; not but what, if they searched the records of the Patent Office in this country, they might probably find the germs of that invention. He had the good fortune to be in New York at the time of the great Exhibition there, and he was struck with the great amount of novelty in many of the machines exhibited. There were machines for almost every domestic operation, amongst which he remarked an apple-paring machine, by means of which thousands of bushels of apples might be pared by steam machinery. Then, again, there were the washing machines, which he believed were of American origin; in fact, there was scarcely any operation connected with the domestic arts to which machinery had not been made applicable. He could not help feeling, during the reading of the paper, that there were many matters in which they might take example from their excellent cousins—particularly with regard to ferry boats and river steamers. At the present moment there was hardly an instance of accommodation in this country, in the steam boats, equal to what they obtained for a penny in America, and the cabins of our river boats were a disgrace to the present civilised age. The only exception to that state of things that he was acquainted with, was in the case of the ferry boats lately established between Tilbury and Gravesend, where the cabin accommodation was of a better order. There was one matter of peculiar interest mentioned in the paper, that was, that, in America, efforts were being made to replace the cumbrous water-wheel by the turbine. That had been a matter of considerable interest and discussion, a paper upon it having been read before the British Association, and it would be gratifying if it should lead to a more economical application of water-power than was at present in use. He was glad to find that, although Englishmen had hitherto been somewhat badly treated in America as to the matter of patents for inventions, that injustice had at length been done away with, and an Englishman could now obtain a patent upon the same terms as a native of that country. Americans had long looked upon English patents as most valuable property; but it was to be remembered that patented property was better protected in America than in this country, from their entertaining more just views of the rights of labour than was the case in England; and he trusted America and England would derive mutual advantage from the more liberal policy which had lately been adopted. He begged to propose a vote of thanks to Dr. Eddy for his valuable paper.

The vote of thanks was then passed.

The Paper was illustrated by a large number of models and diagrams of the various machines and appliances described by the author.

The Secretary announced that on Wednesday evening next, the 10th inst, a Paper by Dr. Milligan, "On the Products and Resources of Tasmania," would be read.

Home Correspondence.

ARRANGEMENT IN THE FORTHCOMING EXHIBITION OF 1862.

Sir,—I was not able to be present at the meeting, on the 13th March, when Professor Ansted's paper was read, but as the subject is one which cannot be too much ventilated at the present moment, and as the company with which I am connected are intending exhibitors of one of the manufactures more particularly referred to, perhaps you will find room for the following brief remarks.

In the first place, while full sympathising with the Professor's desire to have a well-digested plan, I must entirely demur to his suggestion that it should be carried out by officers appointed by the commissioners. One of the speakers in the discussion which followed, fully and truly represented the general feeling of the manufacturers, when he said that the "sort of despotism alluded to" would not be submitted to. What we want is, that a plan should be settled, within the radius of which each manufacturer should be at liberty to act as seemeth best to him. Suggestions would receive every attention, but instructions would be ill received if they entered into too much minutiæ.

Professor Ansted's suggestion that mineral manufactures should be exhibited in conjunction with the raw material from which they are produced, will, I think, meet with very general approval. Doubtless such an arrangement would add vastly not only to the attraction, but also to the instructiveness of the Exhibition, and I quite agree with him that the plan presents no insuperable difficulties. Class E, in which it is proposed to exhibit minerals forming the essential ingredients of the accompanying specimens of manufacture, appears at first sight surrounded with difficulties. On consideration, however, these vanish; take, for instance plumbago crucibles (alluded to by the professor), and in which I am more particularly interested. Here we have an article manufactured of about three parts plumbago and one part clay. It is our intention to exhibit the raw material plumbago in its natural and prepared states, in conjunction with the manufactured article, crucibles. We also propose to exhibit a sort of epitome of the other materials employed in conjunction with plumbago, so that those interested may see at a glance the entire component parts of the finished crucibles. The remark that "careful lists of desiderata should be prepared beforehand, and direct solicitation made in the proper quarter for the particular object required and no other," appears to me highly important. The Exhibition should not be a bazaar, where anyone may show what he pleases, but, as far as possible, a collection of the productions of the first manufacturers in each department, and this can only be brought about by direct personal solicitation. Here is an opening for the competent persons alluded to in the paper. Instead of arranging for the various exhibitors, let them enter into arrangements with those parties. We are all willing to be aided, while objecting to be drilled. The question of keeping together the productions of each nation, &c., and many others, touched upon in the paper and discussion, merit the consideration of all who feel an interest in the forthcoming Exhibition, and will, I hope, now that the subject has been fairly broached, be discussed in the *Journal*. I am, &c.,

T. V. MORGAN.

Patent Plumbago Crucible Company.

THE UNITED STATES PATENT OFFICE OPEN TO EUROPEAN INVENTORS.

Sir,—As your *Journal* circulates among inventors in all parts of the British Empire, it is a suitable medium for announcing that English and other European inventors are now admitted to the privileges of the United States Patent Office on equal terms with American citizens. Hereafter, patents are to run seventeen years instead of fourteen, but are not subject to renewal. The specifications are to be printed, which, being duly certified, are to be taken as evidence in the courts. Inventions which have been patented in other countries cannot be patented in the United States after any other foreign patent shall have expired. Inventors, therefore, should procure their patents first in the United States, except in cases where such prior obtaining of an American patent will invalidate a patent proposed to be granted subsequently in some other country.

By an inadvertance in the framing of the Act, ornamental designs are excepted. No patent can be granted to aliens unless they shall have resided one year in the United States, and taken oath of their intention of becoming citizens thereof.

A uniform charge of seven guineas (thirty-five dollars) is the only fee; all discriminating fees are abolished.

Labour-saving inventions will find ready acceptance there, the more, perhaps, as the unwise tariff just enacted may give a fresh impetus to domestic industry. In condemning my countrymen for their impolitic tariff before the British public, I may not do so without a word of animadversion against the charge of 100 per cent. to which tea is subjected in this country, which, both in a sanitary and moral point of view, is to be deplored, and perhaps commercially also.

Now that justice has been done by the United States to foreign inventors, there is reason to hope that authors may not long he defrauded by the absence of an international copyright bill. I am, &c.,

D. J. MACGOWAN.

12, Regent-square, W.C., April 2, 1861.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Royal Inst., 3. Prof. Helmholtz, "On Musical Acoustics."
United Service Inst., 7½. Captain E. P. Halsted, R.N., "Iron Clad Ships."
British Architects, 8. Professor Willis, F.R.S., "On the Architectural History of Chichester Cathedral, and on the Fall of the Tower."
Royal Geographical, 8½. 1. "N.W. Australia, Report on the Organisation of the Exploring Expedition from Perth to the N.W. Coast of Australia;" by Mr. F. T. Gregory. 2. "N.E. Australia, Memoranda on the Ports of," by Mr. A. C. Gregory; with "Report on the Exploring Expedition to the River Burdekin;" by Mr. J.W. Smith, R.N., communicated by Sir George Bowen, Governor of Queensland, through the Duke of Newcastle. 3. "S. Australia, Expeditions in;" by the Governor, Sir R. Mc Donnell, and Major Warburton. 4. "Latest News from the Expedition to the Sources of the White Nile; under Captains Speke and Grant."
Medical, 8½. Clinical Discussion.
Tues. ...Royal Inst., 3. Prof. Owen, "On Fishes."
Syro-Egyptian, 7. Anniversary, 7½. Mr. R. C. Marsden, "Some Remarks on Cartouches of Egyptian Kings, according to Mr. Sharpe's List."
Civil Engineers, 8. Continued Discussion upon Mr. Murray's Paper, "On the North Sea."
Medical and Chirurg., 8½.
Zoological, 9.
Wed. ...Literary Fund, 3.
Royal Inst., 3. Prof. Helmholtz, "On Musical Acoustics."
Archæological Assoc., 4. Anniversary.
Society of Arts, 8. Dr. Milligan, "On the Products and Resources of Tasmania."
Geological, 8.
Graphic, 8.
Royal Soc. Literature, 8½.
Thurs...Royal Inst., 3. Prof. Tyndall, "On Electricity."
Royal Society Club, 6.
Philological, 8.
Artists and Amateurs, 8.
Royal, 8½.
Antiquaries, 8½.
Fri. ......United Service Inst., 3. Major Miller, R.A., "The Italian Campaign of 1859." Part 1., General Account.
Astronomical, 8.
Royal Inst., 8. Prof. Helmholtz, "On the Application of the Law of the Conservation of Force to Organic Nature."
Sat. ...Royal Inst., 3. M. Max Muller, "On the History of Language."
Royal Botanic, 3¾.

PATENT LAW AMENDMENT ACT.

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APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, March* 22*nd*, 1861.]

Dated 11*th March*, 1861.

596. J. C. Fisher, Padfield, Derby—Imp. in machinery or apparatus for preparing and spinning fibrous materials.
597. J. Bunnett, Deptford, Kent—Imp in the manufacture of bricks and tiles, and in machinery for that purpose.
599. A. Myers, Hutchison-street, Houndsditch—Imp. in the manufacture of boots, particularly adapted for ladies' wear.
600. G. Williams, Park Nook, Quorndon, Derbyshire—Improved apparatus for arresting the progress of railway accidents.
601. J. H Johnson, 47, Lincoln's-inn fields—Imp. in life belts and swimming belts. (A com.)
602. J. T. Hutchings, Charlton, Kent—Imp. in the manufacture of of boots, shoes, and other coverings for the feet, and in tools for cutting the soles of such articles.
603. W. Tillie, Londonderry—Imp. in machinery for making frills.
604. J. Hirst, jun., and J. Hollingworth, Dobcross, Saddleworth, Yorkshire—Imp. in means or apparatus employed in weaving.

Dated 12*th March*, 1861.

605. J. Tomlinson, Kegwork, Leicester—An improved buckle plate or apparatus used for attaching and detaching horses when in harness, or for other purposes to which the same may be applicable.
606. A. S. Stocker, Wolverhampton—Imp. in the manufacture of rails for railways.
607. T. F. Griffiths, Birmingham—Imp. in machinery for raising or shaping metals.
608. A. Aerts, Place Verte, Anvers, Belgium—Imp. in apparatus for lubricating the moving parts of machinery.
609. E. Frementin and M. Aubonnet, Bordeaux—Improved apparatus for cutting wood for lucifer matches.
610. G. L. Ripamenti, Bordeaux—Imp. in the nautical compass.
611. W. Perry, Wednesbury, Staffordshire—Certain imp. in the manufacture of gun barrels.
612. R. H. Gratrix, Salford—Imp. in dyeing and printing textile materials and fabrics.

[*From Gazette, March* 29*th*, 1861.]

Dated 17*th December*, 1860.

3090. J. G. Taylor, Paris—Imp. in dress and other fastenings, and in the application and manufacture thereof.
3100. J. G. Taylor, Paris—Imp. in the manufacture of boots and shoes, and in the method of measuring the human foot for fitting tho same.

Dated 5*th January*, 1861.

38. J. Roberts, Upnor, Kent—An improved warming hassock or footstool.

Dated 21*st January*, 1861.

158. F. W. Perrott, Hanover cottage, Hanover-street, Walworth—An improved lubricating grease or paste for railway wheels and all kinds of machinery.

Dated 20*th February*, 1861.

420. T. Holstead, Botchergate, Carlisle—Imp. in apparatus for tho manufacture of certain articles of confectionery and biscuits and other articles from plastic substances.

Dated 21*st February*, 1861.

438. H. P. Ribton, Dublin—Imp. in safety apparatus for lighting mines.

Dated 25*th February*, 1861.

474. J. Pinchbeck, Russell-street, Reading, Berkshire—Imp. in glass water-gauges and pet-taps of steam boilers.
484. J. Howard and E. T. Bousfield, Bedford—Imp. in the construction of windlasses, and implements applicable to steam cultivation.

Dated 9*th March*, 1861.

591. B. Walker and W. Tilson, Lenton, Nottinghamshire—Imp. in machinery or apparatus for the manufacture of bobbin net or twist lace.

Dated 13*th March*, 1861.

613. G. Spencer, 6, Cannon-street West—Imp. in india rubber springs for railway and other uses.
614. J. Farren, Clapham, Surrey—Imp. in preventing incrustation in steam boilers, in tanks for containing the feed for the same, and in bars for the furnaces thereof.
615. A. Peek, Manchester—Imp. in treating or preparing textile materials and fabrics.
617. D. Hebson and W. G. Ramsden, Liverpool—Imp. in apparatus for obtaining fresh water from salt water.
618. W. Walker and D. Walker, Lindley, Yorkshire—Imp. in machinery for producing rovings or slubbings of wool or other fibres.
619. J. Cimeg, 162, Great Portland-street—Imp. in silvering glass and other surfaces.
621. O. Saulay, Bordeaux, France—Imp. in stopping or closing bottles, vases, cans, and similar articles, whether of glass, metal, or other material.
622. J. L. Jullion, Tynemouth—An imp. in the apparatus used in the manufacture of paper.

623. J. W. Aston, Cradley, Worcestershire—Imp. in the manufacture of vices.

624. J. Jeffreys, Norwood, Surrey—Imp. in the construction of houses and footways.

Dated 14*th March*, 1861.

625. A. J. Joyce, Upper Gower-street, Middlesex—Imp. in means for indicating and representing various meteorological or atmospherical phenomena or influences.

627. R. T. Pattison, Daldorch-house, near Catrine, Ayr, and A. M. Pattison, Glasgow—Imp. in the means and method of fixing colours in connection with the printing of woven fabrics and yarns.

629. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus for saving life at sea or in other waters. (A com.)

631. D. Fryer, Carlton-square, Old Kent-road, Surrey—Imp. in the construction of candlesticks and lamps, in order to render them self-extinguishing.

632. F. Roessler, Bird-street, St. George's-in-the-East—Imp. in apparatus or means for preventing locomotive engines and carriages leaving the rails.

633. W. Clark, 53, Chancery-lane—Imp. in bridges. (A com.)

634. J. H. Wilson, Liverpool—Imp. in pumps.

635. G. Simmons, 40, Frederic-place, Hampstead-road—Imp. in apparatus for making connections with gas and water mains.

637. E. T. Truman, Old Burlington-street—Imp. in masticators or apparatuses for preparing gutta percha, caoutchouc, and other similar substances.

638. E. A. Pontifex, Shoe-lane—Imp. in charging, tunning, or fermenting casks and vessels.

639. J. Hunter, Coltness Iron Works, Cambusnethan, Lanark, N.B.—Imp. in moulding and shaping metals.

Dated 15*th March*, 1861.

641. B. Samuelson, Banbury—Imp. in machines for breaking up and cultivating land.

642. J. A. Phillips, 12, Earl's-court, Kensington—Certain imp. in the manufacture of white lead, and other salts of lead, direct from ores containing carbonate of lead.

643. J. Bigourat, 2, Gloucester-place, Brixton-road, Surrey—Improving the manufacture of harmoniums.

644. W. Collins, Sandon-street, Salford—Imp. in water, steam, and mercury guages.

645. C. Stevens, 31, Charing-cross—An improved regulator for looms. (A com.)

646. J. Marson, Livery-street, Birmingham—Imp. in breech-loading fire-arms and their projectiles.

647. T. Griffiths, Birmingham—An imp. or imps. in machinery or apparatus for signalling on railway trains.

648. A. Granger, Holborn—Imp. in the manufacture of hats, bonnets, waistcoats, and trimmings for wearing apparel.

650. W. Lorberg, 34, Saint Mary-at-Hill, Eastcheap—An improved process for obtaining and utilizing the chemical products of spent bark (commonly called "tan') and all other woody fibres, also improved apparatus to be employed therefor.

651. C. J. Burnett, 21, Ainslie-place, Edinburgh—Imp. in the structure and construction of ordnance and other fire-arms, and of projectiles to be used with them.

652. F. Trachsel and T. Clayton, Manchester—Imp. in the manufacture of gas, and in the apparatus employed therein.

653. E. Green and J. Green, Broadfield Mill, Lockwood, near Huddersfield—Imp. in carding engines.

654. A. Smith, Brentwood, Essex—Imp. in machinery for cleansing or dressing bass, flax, and other vegetable fibres, applicable also to the thrashing of corn and other grain.

655. W. Schnell, Fitzroy-square, Middlesex—Imp. in the mode of and apparatus for manufacturing lucifer matches.

656. J. Deakin, Birmingham—Imp. in sash frames and sashes, and in balance weights to be used therewith, which said balance weights may be also employed with ordinary sashes or shutters, or for any similar purpose.

657. J. Watkins, Birmingham—Imp. in railway brakes.

659. J. Penn, Newton, Staffordshire—Imp. in whistles or water indicators for steam boilers.

660. S. Perkins, Gorton Works, near Manchester—Imp. in machinery or apparatus for drilling, boring, and cutting metals.

661. W. Cloutman, Calverton, Berkshire—Imp. in tanks or vessels for dairy use.

Dated 16*th March*, 1861.

662. A. Krupp. Essen, Prussia—Imp. in the construction of mortars, and in the means of attaching the same to the carriages used therewith.

663. J. I. Taylor, Manchester—Imp. in apparatus for the manufacture of gas from coal, oil, or oleaginous substances, and other purposes.

664. J. Holden, Manchester—Imp. in looms, and in apparatus connected therewith.

665. A. Drevelle, Manchester—Imp. in presses for pressing or finishing textile fabrics.

667. F. Jenkin, Stowting, Kent—Imp. in the construction of bridges.

669. A. Prince, 4, Trafalgar-square, Charing-cross—An improved electro-galvanic friction brush. (A com.)

670. W. F. Henson, New Cavendish-street, Portland-place—Imp. in railway carriage, buffer, and other springs.

671. E. E. Scott, Windsor-place, Dundee—Imp. in breech-loading fire-arms.

Dated 18*th March*, 1861.

676. J. Arrowsmith, Bilston, Staffordshire—Imp. in street railways and railways on common roads, and in locomotive engines and carriages for the said railways.

678. C. L. Kottula, Holborn—Imp. in the manufacture of soap.

680. W. E. Newton, 66 Chancery-lane—Imp. in machinery for drawing and spinning wool and other fibrous substances. (A com.)

Dated 19*th March*, 1861.

686. A. Wall, 20, Canton-street, East India-road, Poplar—An improved mode of preventing corrosion in boiler tubes.

688. J. Smith, Seaforth, near Liverpool, and S. A. Chease, Liverpool—An improved telegraphic apparatus.

620. G. W. Hawksley, Bridge-hill, and M. Wild, Carlisle-street East, Sheffield—Imp. in steam boilers.

692. G. Wilson, York—Imp. in glass stoppers, applicable to feeding bottles, retorts, and other vessels.

Dated 20*th March*, 1861.

693. T. Brooks, Sunnyside, near Rawtenstall, Lancashire—Imp. in producing combinations of certain colours on cotton fabrics.

695. H. A. Bartlett, Thetford—Imp. in apparatus to protect the flame of a candle from draught.

697. R. A. Brooman, 166, Fleet street—Imp. in preparing caoutchouc adapted especially to dental purposes. (A com.)

[*From Gazette, March* 22*nd*, 1861.]

INVENTION WITH COMPLETE SPECIFICATION FILED.

685. J. J. O. Taylor, 12, Mark-lane—An imp. in the separation of silex and silicious and other matters from steel.—19th March, 1861.

PATENTS SEALED.

[*From Gazette, March* 29*th*, 1861.]

March 27*th.*

2155. B. Oldfield.
2354. J. Aspell, E. Booth, and J. Hurst.
2357. J. A. Callander.
2366. J. Clark, W. Pollock, and J. Whyte.
2370. C. H. Hurst, H. Horsey, and G. Baker.
2373. R. Hellard.
2375. J. Bullough and J. Walmsley.
2376. R. Whittam.
2377. B. H. F. Macnamara.
2384. G. Rhodes and J. Syme.
2385. J. Brokenshire.
2386. J. L. Norton.
2387. G. E. Taylor.
2390. J. Bower and D. F. Bower.
2392. A. W. Williamson and L. Perkins.
2393. J. H. Riddell.
2395. R. J. Cole.
2396. A. I. Mahon.
2404. J. Sootheran and J. Carr.
2437. L. J. O. Jolly.
2439. W. Clark.
2445. J. Edge.
2460. J. Ramsbottom.
2478. W. Barker.
2730. G. Wilson.
2882. W. R. Bowditch.
2933. W. M. Storm.
3026. R. A. Brooman.
19. G. Lowry.
36. W. M. Williams.
226. W. E. Newton.
244. A. Boyle.

[*From Gazette, April* 2*nd*, 1861.]

April 2*nd.*

2402. J. A. Knight.
2407. J. Morris.
2408. C. Tuckett.
2409. C. Callebaut.
2111. W. MacNaught.
2423. J. Platt.
2424. A. Sarjeant.
2425. W. Yates.
2429. D. Cope.
2430. S. Whitaker.
2433. J. A. Knight.
2438. J. Calkin.
2442. E. Gardner.
2444. W. Snell.
2446. E. Worthington & R. Mills.
2451. R. Anderson.
2453. R. Hands and R. M. Hands.
2454. J. Chandler.
2458. F. Danby.
2465. D. G. FitzGerald.
2469. G. T. Bousfield.
2470. G. F. Stidolph & J. Stidolph
2471. T. Whitby & W. Dempsey.
2507. C. Stevens.
2533. W. Sear.
2534. R. G. McCrum.
2548. W. Andrews.
2557. A. G. Hunter.
2595. W. Eddington, jun.
2655. A. V. Newton.
2689. W. E. Newton.
2787. W. Brookes.
2850. W. Clark.
2959. W. Pilkington.
3162. C. Lizars.
3174. W. R. Mulley.
163. R. Mushet.
169. G. White.
175. J. Chatterton.
213. R. Mushet.
290. A. E. Chasteau de Balyon.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, March* 29*th*, 1861.]

March 25*th.*

678. W. Oldfield & T. O. Dixon.
692. A. Perez.

March 26*th.*

654. J. A. V. Burq.
659. J. R. Breckon & R. Dixon.

March 27*th.*

674. T. Steven, T. Reid, and T. Frew.

[*From Gazette, April* 2*nd*, 1861.]

March 28*th.*

664. J. C. Durand.
667. E. A. Jacquin.
731. R. Hornsby, jun.

March 30*th.*

686. J. Mercer.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, March* 29*th*, 1861.]

March 26*th.*

742. W. E. Newton.